5-3-74

Progress Report for 1973

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REDHEADED PINE SAWFLY POPULATION BUILD-UP FOLLOWING CHEMICAL CONTROL

USDA, Forest Service, Northeastern Area
State & Private Forestry, Forest Pest Management

1st rough draft

S-3-74

April, 1974

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THE IMPACT OF REDHEADED PINE SAWFLY ON RED PINE IN MICHIGAN and REDHEADED PINE SAWFLY POPULATION BUILD-UP FOLLOWING CHEMICAL CONTROL

By

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INTRODUCTION

An evaluation project was started ~~the summer of 1971~~ in the summer of 1971 in the Cadillac, Michigan area to evaluate the impact of the redheaded pine sawfly on red pine. Field data have been collected in 1971, 1972, and 1973 in that area.

Two red pine plantations also in the Cadillac area were sprayed in 1969 or 1970. The plantations were sampled for renewed sawfly activity in 1971, 1972 and 1973.

OBJECTIVES

The objectives as set forth in the study plans are:

1. To determine the impact of the redheaded pine sawfly on young hard pine plantations.
2. To determine rapidity of population build-up in young pine plantations following control operations.

HIGHLIGHTS

Insect

Very low sawfly populations have been maintained on the red pine in the plantations sprayed with malathion in 1969 and 1970. A build-up of sawfly occurred this year (1973) on jack pine that has invaded the Harrietta spray plantation. Also sawfly are supported on jackpine in the Anderson impact evaluation plantation.

Sawfly mortality expressed as a percentage of total eggs laid in all Cadillac area plots was 65% egg mortality in 1972 and 85% egg mortality in 1973. The major mortality factors measured are tree vigor and egg parasitism. In those areas where population collapse occurred in 1972, a resurgence of the sawfly is occurring on invading jack pine occupying the eroded droughty sites.

Tree

Tree recovery rates after attack are related to the macro-site the tree occupies as well as the tree's vigor. Population decline within a stand occurs after the stressed tree's food source is depleted. Sawfly attack, egg eclosion and larval survival are correlated with tree vigor.

The "PSCD" survey[1/] shows the following changes in tree classes between 1971 and 1973:

	Sawlog	Sawfly Degraded Sawlog	Pulp	Sawfly Caused Cull	Natural Culls	Dead
1971	32%	4%	44%	5%	8%	8%
1973	26%	0.4%	48%	0.3%	13%[a]	11%
Change	-6%	-3.6%	+4%	-4.7%	+5%	+3%

[a]Includes trees culled because of sawfly feeding damage which are not expected to recover and be suitable for pulpwood.

[1/]Explained in Progress Report for 1971. The system rates the trees as to potential product or cull or dead on the basis of sawfly damage.

The results of the foliar analysis of attacked and non-attacked trees for levels of the essential elements N, P, and K shows differences do exist. Also, foliage moisture contents differ between successfully attacked and non-attacked trees.

Tree height is not a barrier to sawfly attack, as 20 foot tall trees in Upper Michigan and 65 foot tall trees in Ontario were attacked. In the latter, the sawfly were feeding in the lower 2/3 of the crown.

The current outbreak of sawfly in the Cadillac area has provided invaluable information into site preferences for the sawfly and tree response on those sites to sawfly feeding. Site related attack preference appears to be those sites on which moisture available to the tree is limited; i.e., root competition from adjacent hardwoods, root competition from bracken fern, and droughty soils lacking adequate water holding capability. Soils lacking water holding capability are those eroded soils lacking upper horizons, overburden soils, sand blows, and rocky outcrop soils. Also trees growing on sandy-clay soils with pHs of 7.0 or higher and imperfectly drained soils are severely attacked.

The shallow rocky outcrop soils support the most serious sawfly attacks. On these soils the pocket activity pattern is difficult to discern and the insects are more dispersed through a given stand. The trees being attacked give no outward appearance of stress. Because of this, predictions of losses in red pine stands on those soils will be difficult and closer attention will have to be given to such stands to prevent serious damage.

Prediction of sawfly attack sites and impact on the host trees appears possible in most situations.

The evaluation program was expanded by examining plantations in Upper Michigan, northern Wisconsin, Ontario and Western New York. The site characteristics of attacked and non-attacked portions of plantations were similar in most geographic areas.

1974 PROGRAM

The sawfly population has generally collapsed in the Cadillac area. However, populations appear to be building again on jack pine within some study areas. Egg surveys (June), mid-season larval surveys (late July), and defoliation surveys (August) are essential to assess renewed activity. The jack pine will be examined for increased sawfly activity in the Anderson plots and the Harrietta spray plot.

The red pine growth, yield and evaluation computer program by Al Lundgren will be used in the impact study areas to estimate the impact of the sawfly on the final stand. The procedure will be modified to take into account the non-randum distribution of the sawfly population.